5.11 Soils

This section describes the potential effects of the construction and operation of the Contra Costa Generating Station (CCGS) on soil resources and is organized as follows:
Section 5.11.1 describes the existing environment that could be affected, including soil types and their use; Section 5.11.2 presents the environmental analysis of project development; Section 5.11.3 discusses cumulative effects; Section 5.11.4 presents mitigation measures; Section 5.11.5 presents the laws, ordinances, regulations, and standards (LORS) applicable to soils and their use; Section 5.11.6 provides agency contacts for all involved agencies; Section 5.11.7 describes permits required for the project; and Section 5.11.8 provides the references used to develop this section.

5.11.1 Affected Environment

The project site is located in Oakley, California, near the junction of Highway 4 and Highway 160, in Contra Costa County. The San Joaquin River and adjacent wetlands are located to the north and east of the site, vineyards and the BNSF railroad corridor are located to the south, and industrial facilities and the Highway 160 corridor are located to the west. The site is on the southwestern corner of a property owned by DuPont, within an area called the DuPont "Western Development Area." The site is essentially a green field site within a brown field site. While the CCGS site has never been developed, DuPont operated a manufacturing plant on a portion of the Western Development Area from 1956 to 1998. DuPont produced tetraethyl lead, Freon, and titanium dioxide. The tetraethyl lead plant ceased operations in 1981, the Freon plant ceased operations in 1997, and titanium dioxide production ceased in 1998. Most of the associated buildings were demolished in 1999.

In coordination with the California Department of Toxic Substance Control (DTSC), DuPont remediated soil contaminants and restored the property. In 2006, DTSC issued a decision of Corrective Action Completion without controls for three parcels of the DuPont property, including the Western Development Area, and indicated that these parcels are suitable for unrestricted land use development.

The project laydown area will be directly east of the project site on land previously used for disposal of titanium dioxide. This area is not included in the "Western Development Area," and the titanium dioxide landfill is still present.

The CCGS will connect with the existing Pacific Gas and Electric Company (PG&E) substation within an existing 1.7-mile transmission corridor. Existing steel-lattice towers will be replaced with monopole towers. A connection will be made to PG&E's existing high-pressure natural gas pipeline at the Antioch Terminal, which is immediately south of the DuPont property along Bridgehead Road. The project will connect with the existing 24-inch-diameter potable water supply line and sanitary sewer line located on the DuPont property. No offsite linear features are expected to be constructed.

A description of the soils in the proposed project area was developed using the online Soil Survey of Contra Costa County, California (Natural Resources Conservation Service [NRCS], 2009). Descriptions of the soil mapping units were developed from the soil survey and the online soil series descriptions (Soil Survey Staff, 2009).

Soil map units for the project area are identified in Figure 5.11-1. Soil map unit characteristics for the area potentially affected by project construction are summarized in Table 5.11-1. The project area includes the project site, construction laydown area, and transmission corridor where replacement towers will be constructed. The table summarizes depth, texture, drainage, permeability, water runoff, and items related to revegetation potential. Actual soil conditions in the project area could differ from what is described in the generalized soil descriptions because of the potential for previous grading or other earthmoving activities at the site, and natural soil variations.

5.11.1.1 Agricultural Use

Aerial photography and site reconnaissance confirm that vineyards are located on the project site and directly to the south. Other croplands near the project site and transmission corridor are also planted in vineyards. Soils associated with the project site, laydown area, stockpile areas, and a portion of the transmission corridor are classified as Farmland of Statewide Importance. Issues associated with land use (e.g., cancellation of Williamson Act contracts) are discussed in Section 5.4, Land Use.

5.11.1.2 Wetlands

A 0.62-acre mitigation wetland, previously constructed by DuPont, is located on the northwestern corner of the project site. Construction and operation of the proposed project will not impact this feature. Wetlands are described in Section 5.2, Biological Resources.

5.11.1.3 Soil Mapping Units

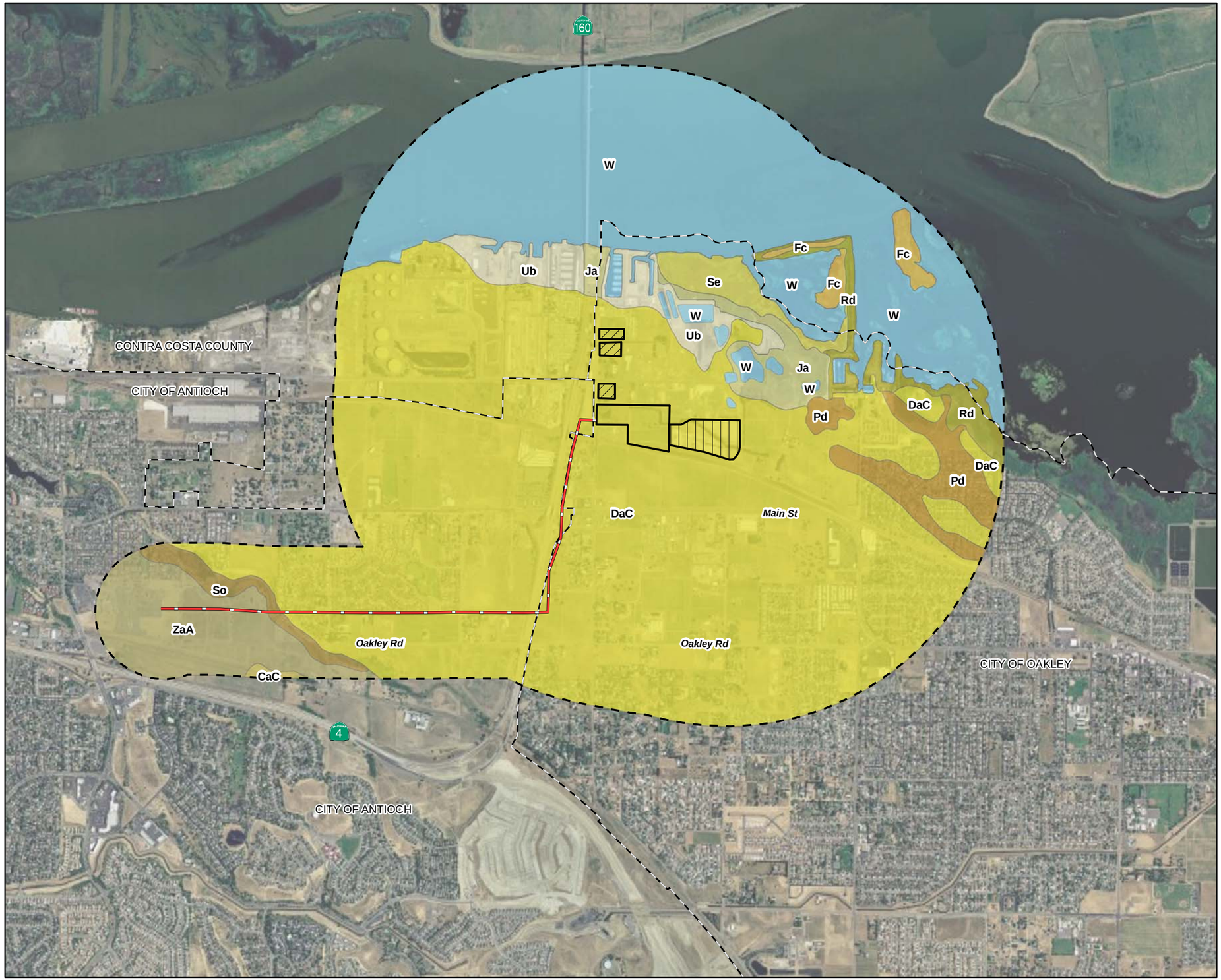
Table 5.11-1 describes the properties of the soil mapping units that are found in the vicinity of the project site. As shown in Figure 5.11-1, the entire project site, laydown area, stockpile areas, and the majority of the transmission corridor are associated with a single soil map unit—Delhi sand, 2 to 9 percent slopes (DaC). This soil formed in eolian (i.e., deposited by wind) materials derived from granitic rock sources. Delhi sands are very deep and somewhat excessively drained, with a low shrink-swell potential.

The west side of the transmission corridor crosses two other soil units: Sycamore silty clay loam (So) and Zamora silty clay loam (ZaA). These soils have finer textures than Delhi sand, somewhat lower permeability, and moderate shrink-swell potentials.

Other soil units that are in the vicinity of the project site to the north and east include Urban lands (Ub); and lowland Delta soils associated with wetlands, including Fluvaquents (Fc), Joice muck (Ja), Shima muck (Se), and Rindge muck (Rd). Other mineral soils in the vicinity of the project site include Piper sands (Pd) to the east, and Capay clay (CaC) to the south of the transmission corridor.

5.11.1.4 Potential for Soil Loss and Erosion

The factors that have the largest effect on soil loss include steep slopes, lack of vegetation, and erodible soils composed of large proportions of silt and fine sands. The soils found in the project area are predicted to have slopes ranging from 2 to 9 percent.



LEGEND

- EXISTING 60kV TRANSMISSION LINE
- DIRT STOCKPILE AREAS
- LAYDOWN AREA
- PROJECT SITE
- CITY LIMITS
- BUFFER

SOIL TYPES

- CaC - CAPAY CLAY, 2 TO 9 PERCENT SLOPES
- DaC - DELHI SAND, 2 TO 9 PERCENT SLOPES
- Fc - FLUVAQUENTS
- Ja - JOICE MUCK
- Pd - PIPER SAND
- Rd - RINDGE MUCK
- Se - SHIMA MUCK
- So - SYCAMORE SILTY CLAY LOAM
- Ub - URBAN LAND
- W - WATER
- ZaA - ZAMORA SILTY CLAY LOAM, 0 TO 2 PERCENT SLOPES

Notes:
1. 1 mile around Project Site, 1/4 mile around NG Pipeline and Transmisson Line.
2. Source: U.S. Department of Agriculture, Natural Resources Conservation Service, Soil Survey Geographic (SSURGO) database for Contra Costa County, California.

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 1,000 2,000
Feet
1:24,000

FIGURE 5.11-1
SOIL TYPES
CONTRA COSTA GENERATING STATION
OAKLEY, CALIFORNIA

CH2MHILL

SAC\\ZION\SACGIS\PROJ\RADBACKENERGY\385962\MAPFILES\SOILS.MXD MHASKELL 6/11/2009 13:26:56

TABLE 5.11-1
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description	
DaC	**Delhi sand, 2 to 9 percent slopes:** The entire CCGS project site, stockpile and laydown areas, and the majority of the transmission corridor are associated with this soil unit.	
	Formation:	Wind modified material weathered from granitic rock sources
	Typical profile:	Sand to a depth of >60 inches
	Shrink-swell capacity:	Low
	Depth and drainage:	Very deep, somewhat excessively drained
	Permeability:	Rapid
	Runoff:	Negligible to low
	Inherent fertility:	Fair
	Capability class:	3s (irrigated), 6e (non-irrigated)
	Taxonomic class:	Mixed, thermic Typic Xeropsamments
So	**Sycamore silty clay loam:** A portion of the transmission corridor crosses this soil unit.	
	Formation:	Mixed sedimentary alluvium
	Typical profile:	Silty clay loam over silt loam and stratified loamy fine sand to silty clay
	Shrink-swell capacity:	Moderate
	Depth and drainage:	40-60 inches to water table, poorly drained
	Permeability:	Moderate to moderately slow
	Runoff:	Slow to very slow
	Inherent fertility:	High
	Capability class:	1 (irrigated), 4c (non-irrigated)
	Taxonomic class:	Fine-silty, mixed, superactive, nonacid, thermic Mollic Endoaquepts
ZaA	**Zamora silty clay loam, 0 to 2 percent slopes:** A portion of the transmission corridor crosses this soil unit.	
	Formation:	Alluvium derived from sedimentary rock
	Typical profile:	Silty clay loam to a depth of 72 inches
	Shrink-swell capacity:	Moderate
	Depth and drainage:	Very deep, well drained
	Permeability:	Moderately slow
	Runoff:	Slow to medium
	Inherent fertility:	High
	Capability class:	1 (irrigated), 4c (non-irrigated)
	Taxonomic class:	Fine-silty, mixed, superactive, thermic Mollic Haploxeralfs

Soil characteristics are based on soil mapping descriptions provided in the online soil survey reports (http://soildatamart.nrcs.usda.gov/) and Official Soil Series Descriptions (http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi). Soil descriptions provided above are limited to those soil units that could be directly affected by the CCGS. Other soil mapping units, which are outside of the project area but are shown on Figure 5.11-1, are identified in Section 5.11.1.3.

In general, Delhi soils at the project site have a sandy texture, with over 95 percent of soil particles having a diameter of 0.05 to 2 millimeters (i.e., sand particles). These soils are fairly level and excessively drained with a low runoff potential. Therefore, soils at the project site are expected to have low water erosion potential. On the other hand, Delhi soils are expected to have high wind erosion potential. It is expected that the laydown areas will be covered (by gravel or paving) immediately after grading to prevent subsequent wind erosion losses.

The silty clay loam surface horizons of the Zamora and Sycamore soils associated with a portion of the transmission corridor are not expected to be as readily transported by wind.

5.11.1.5 Other Significant Soil Characteristics

A significant soil characteristic concerning the proposed 20-acre laydown area is the presence of waste titanium dioxide. A portion of this area was historically used for disposal of titanium dioxide waste during manufacturing operations at the DuPont facilities. Titanium dioxide (TiO_2) is an inert mineral pigment primarily used in paints, paper, and plastics, and is produced by reacting the mineral rutile, removing impurities, and oxidizing to TiO_2, a very fine pure white powder (DuPont, 2003). During active manufacturing at the DuPont facility, the proposed laydown area was a TiO_2 landfill that was used for disposal of spent ore from the TiO_2 process after being acid-leached and settling in retention basins (DuPont, 2003). This material is estimated to be approximately 3 feet thick (DuPont, 2006); thus, soil material that is present in this area likely does not reflect characteristics of mapped soils. The fill material is not expected to present a human health or wildlife risk (Dupont, 2006). Issues pertaining to worker health and safety are discussed in Section 5.16.

The soil map unit upon which the project will be built (DaC) contains soils with over 95 percent sand-sized particles. A geotechnical review (TRC, 2008) estimated that a moderate liquefaction potential exists at the site due to nature of subsurface soil materials; and that vibrating equipment could potentially cause settlement in these sandy soils. A design-level geotechnical study will be performed, which will specifically identify whether expansive soils are present in the project area and will include measures to mitigate the effects of these soils where they occur.

According to the official soil series description, Sycamore soils may have a seasonally high water table within the top 60 inches of the soil profile. Construction of replacement transmission towers in areas with Sycamore soils may need to include dewatering.

5.11.2 Environmental Analysis

The following sections describe the potential environmental effects on soils during the construction and operation phases of the project.

5.11.2.1 Significance Criteria

The potential for impacts to soil resources and their uses (such as agriculture) were evaluated with respect to the criteria described in Appendix G of the California Environmental Quality Act (CEQA) Guidelines (§15000–15387, California Code of Regulations [CCR] Title 14, Chapter 3). An impact is considered potentially significant if it would:

- Involve other changes in the existing environment which, because of their location or nature, could result in conversion of farmland to non-agricultural use
- Impact jurisdictional wetlands
- Result in substantial soil erosion
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (International Code Council, 1997), creating substantial risks to life or property

The following sections describe the anticipated environmental impacts on agricultural production and soils during project construction and operation.

5.11.2.2 Farmland Conversion

Construction of the proposed project will remove vineyards to build the CCGS, and will permanently remove from production soils that are classified as Farmland with Statewide Importance. According to the City of Oakley General Plan, the project site is located in the Northwest Oakley Planning Area. This area north of the Burlington Northern Santa Fe railroad is designated for Business Park, Utility Energy and Light Industrial uses, and is planned to eventually become a primary employment center for the city (City of Oakley, 2002). Because agriculture is not consistent with these designated uses, farming operations are expected to diminish as development progresses in the area. Therefore, because the CCGS project will not remove prime farmland and is consistent with General Plan designated uses, significant impacts to agriculture are not expected.

5.11.2.3 Jurisdictional Wetlands

A jurisdictional wetland, constructed as mitigation by DuPont, is present on the northwestern corner of the project site. This feature will be protected during construction and operation of the proposed project through implementation of erosion and sediment control best management practices (BMPs). Section 5.2, Biological Resources, addresses this topic in greater detail. Wetlands that are adjacent to the San Joaquin River are located 0.25 mile from the site and will not be affected by the project. Therefore, impacts to wetlands are not expected.

5.11.2.4 Soil Erosion during Construction

Construction impacts on soil resources can include increased soil erosion and soil compaction. Soil erosion causes the loss of topsoil and can increase the sediment load in surface receiving waters downstream of the construction site. The magnitude, extent, and duration of construction-related impacts depends on the erodibility of the soil; the proximity of the construction activity to the receiving water; and the construction methods, duration, and season.

Because conditions that could lead to excessive soil erosion via water are not present at the CCGS project site, little soil erosion from rain events is expected during the construction period. Additionally, BMPs will be implemented during construction in accordance with a site-specific Stormwater Pollution Prevention Plan (SWPPP) that is required under the Clean Water Act for all construction projects over 1 acre in size. The California Energy Commission (CEC) also requires that project owners develop and implement a drainage, erosion, and sediment control plan (DESCP) to reduce the impact of runoff from the construction site. Monitoring will involve inspections to ensure that the BMPs described in the SWPPP/DESCP are properly implemented and effective. Therefore, impacts from soil erosion via water are expected to be less than significant.

While Delhi sands are expected to have low water erosion potential, wind erosion potential is very high. The NRCS identifies wind erodibility group ratings for soils on a scale of 1 to 8, with a rating of 1 for surface soils with the highest susceptibility to soil blowing. There is a close correlation between soil blowing and the size and durability of surface clodiness, rock fragments, organic matter content, and the presence of calcium carbonate. Soil moisture also influences soil blowing. The wind erodibility group value for Delhi sands is 1, indicating a very high erosion potential due to its high sand content. Implementation of BMPs will be

necessary to reduce the amount of soil loss due to wind erosion. Estimates of erosion by water and wind are provided in the following sections.

5.11.2.4.1 Water Erosion

An estimate of soil loss during construction by water erosion is provided in Table 5.11-2. This estimate was developed using the Revised Universal Soil Loss Equation (RUSLE2) program using the following assumptions. Detailed calculations and assumptions for the soil loss estimates are provided in Appendix 5.11A.

- The CCGS construction site totals nearly 22 acres. It is assumed that soil grading at the site will occur over a 2-month period. The soil in this area will then be exposed for an additional 25-month construction period, after which the majority of the site will be paved or covered with CCGS facilities. It is assumed that approximately 50 percent of the project site will have bare soil exposure during the construction period.
- Estimates of soil loss (in tons) were made for the site-specific soil mapping unit characteristics that were all available within the RUSLE2 database.
- RUSLE2 rainfall erosivity conditions were estimated for the CCGS site using the site-specific rainfall estimate for the 2-year, 6-hour storm from online National Weather Service data (NOAA, 2009).

TABLE 5.11-2
CCGS Construction Soil Loss Estimates Using the Revised Universal Soil Loss Equation*

Feature (acreage)[b]	Activity	Duration (months)	Soil Loss (tons) without BMPs	Soil Loss (tons) with BMPs	Soil Loss (tons/year) No Project
Project Site – 21.95 acres	Grading	2	13.5	0.16	6.58
	Construction	25	34.3	0.98	—
Project Laydown Area – approx. 20 acres; 6 acres of which is paved)	Grading	1	2.0	0.0	0.016
	Construction	25	0.0	0.0	—
Stockpile areas – 7.2 acres, 2.2 acres of which are paved	Grading	0	0.0	0.0	0.012
	Construction	25	12.0	0.3	—
Transmission Corridor, tower replacement (17.3-acre construction corridor; 0.009-acre footprint for towers)	Grading	1	0.46	0.006	0.041
	Construction	6	1.16	0.033	—
Transmission Laydown Area – 0.5 acre	Grading	0	0.0	0.0	0.0
	Construction	6	0.0	0.0	—
Project Soil Loss Estimates		**25**	**63.44**	**1.52**	**6.65**

*Soil losses (tons/acre/year) are estimated using RUSLE2 software available online [http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_index.htm].

- A 150-foot slope length was assumed for all soil units. The median of each soil unit slope class was used for the RUSLE calculations. For this project, an average slope of 5.5 percent (mid-point of 2 to 9 percent slope class) was assumed for Delhi soils; an average slope of 1 percent (mid-point of 0 to 2 percent slope class) was assumed for Zamora and Sycamore soils.

Soil losses are estimated using the following RUSLE2 conditions:

- **Construction and demolition** soil losses were approximated using Management as "bare ground, smooth surface;" Contouring: Rows up and down hill; Diversion/terracing: None; and Strips and Barriers: None.
- **Active grading** soil losses were approximated using Management as "bare ground, rough surface" soil conditions; Contouring: Rows up and down hill; Diversion/terracing: None; and Strips and Barriers: None.
- **Construction** soil losses **with implementation of construction BMPs** was approximated using Management as "Silt fence"; Contouring: Perfect, no row grade; Diversion/terracing: None; and Strips and Barriers: two silt fences, one at end of RUSLE2 slope.
- A **"No Project"** soil loss estimate was also approximated using Management as "Single Year/Single Crop Templates/Vineyard/Typical California Vineyards/Vinyard Middles/Perennial Grass Cover Plant in Established Vineyard" for Project Site, and "Dense grass – not harvested" for other areas; Contouring: Rows up and down hill; Diversion/terracing: None; and Strips and Barriers: None.

With the implementation of appropriate BMPs that will be required under the National Pollutant Discharge Elimination System (NPDES) permit, and as described in Section 5.11.4.1, the total project soil loss of 1.5 tons is considered to be a minimal amount and would not constitute a significant impact. It also should be recognized that the estimate of accelerated soil loss by water is very conservative (overestimate of soil loss) because it assumes only a single BMP (that is, silt fencing), whereas the SWPPP will include multiple soil erosion and sediment control measures. Implementation of BMPs will prevent any transported sediment from entering the onsite wetland.

5.11.2.4.2 Wind Erosion

The potential for wind erosion of surface material was estimated by calculating the total suspended particulates (TSP) that could be emitted as a result of grading and the wind erosion of exposed soil. The total site area and grading duration were multiplied by emission factors to estimate the TSP matter emitted from the site. Fugitive dust from site grading was calculated using the default particulate matter less than 10 microns in equivalent diameter (PM_{10}) emission factor used in URBEMIS2002 (Jones and Stokes Associates, 2003) and the ratio of fugitive TSP to PM_{10} published by the Bay Area Air Quality Management District (BAAQMD, 2005). Fugitive dust resulting from the wind erosion of exposed soil was calculated using the emission factor in AP-42 (U.S. Environmental Protection Agency, 1995; also in Table 11.9-4 in BAAQMD, 2005).

Table 5.11-3 summarizes the mitigated TSP predicted to be emitted from the site from grading and the wind erosion of exposed soil. Without mitigation, the maximum predicted

erosion of material from the site is estimated at 12 tons over the course of the project construction cycle. This estimate is reduced to approximately 5.4 tons by implementing basic mitigation measures such as water application (see Section 5.11.4). These estimates are conservative because they make use of emission rates for a generalized soil rather than site-specific soil properties. With the implementation of mitigation measures described in Section 5.11.4.1, impacts related to soil erosion from wind will be less than significant.

TABLE 5.11-3
Soil Loss from Grading and Wind Erosion

Emission Source	Acreage	Duration (months)	Unmitigated TSP (tons)	Mitigated TSP (tons)
Grading Dust:				
Project Site	21.9	2	0.754	0.264
Laydown Area (half of unpaved area)	6.49	1	0.112	0.039
Transmission Line Pole Holes	0.0092	1	0.0002	0.0001
Transmission Line Laydown Area	0.50	0	0.0	0.0
Wind Blown Dust:				
Project Site	10.95	23	7.99	2.80
Laydown Area	0.0	25	0.0	0.0
Transmission Line Corridor	1.73	6	0.329	0.115
Transmission Line Laydown Area	0.50	6	0.0	0.0
Soil stockpile areas	3.60	25	2.85	0.998
Estimated Total		**25**	**12.04**	**5.41**

Note: Assumptions for these calculations are provided in Appendix 5.11A.

5.11.2.5 Expansive Soils

An important characteristic of the proposed CCGS project site is the potential for soils with a moderate shrink-swell potential within the transmission line corridor. The soil map unit that the majority of the project will be built on (DaC) is classified as having low shrink-swell potential, while soils underlying the western portion of the transmission corridor have a moderate shrink-swell potential. The presence of moderately expansive clays in the soil may affect the suitability of the soil as a bearing surface for transmission tower foundations because expansive clays have the potential to heave or collapse with changing moisture content.

A design-level geotechnical soil investigation will being conducted and will determine the presence or absence of expansive soils at the CCGS site, and mitigation will be recommended, as appropriate. With geotechnical evaluation and mitigation (if required), the presence of expansive soils will not create a substantial risk to life or property and this potentially adverse impact will be reduced to a less-than-significant level.

5.11.2.6 Compaction during Construction and Operation

Construction of the proposed project would result in soil compaction by use of heavy equipment during construction. Soil compaction increases soil density by reducing soil pore space. This also reduces the ability of the soil to absorb precipitation. Soil compaction can result in increased runoff, erosion, and sedimentation. The incorporation of BMPs in accordance with the SWPPP/DESCP guidelines during construction will result in less-than-significant impacts from soil compaction.

Before using the construction laydown area, minimal grading is anticipated because the site and proposed laydown areas are already relatively flat. After grading, runoff from the site and laydown area would either be directed into a bioswale, occur as sheet flow, or percolate to groundwater. The laydown area will be covered with gravel to allow wet season use and to further minimize soil erosion potential. Heavy equipment stored on site will be placed on dunnage to protect it from ground moisture. Once construction is completed, the gravel will either be removed from the site or incorporated into onsite paving.

Because the CCGS will be constructed in an area previously used for agriculture, a fair amount of soil compaction will be required to establish foundation areas for buildings. Because these areas will be paved or otherwise protected after construction, the overall anticipated effects of compaction during construction are considered to be less than significant.

Operation of the CCGS would not result in impacts on the soil from erosion or compaction. Routine vehicle traffic during plant operation will be limited to existing roads, all of which are paved or will be covered in gravel, and standard operational activities would not involve the disruption of soil. Therefore, impacts on soil from project operations would be less than significant.

5.11.2.7 Effects of Emissions on Soil-Vegetation Systems

There is a concern that emissions from a generating facility would have an adverse effect on soil-vegetation systems in the project vicinity. This is principally a concern where environments that are highly sensitive to nutrients or salts are downwind of the project.

The proposed CCGS project will include a selective catalytic reduction (SCR) system to control nitrogen oxide (NO_x) air emissions and a carbon monoxide (CO) catalyst to control carbon monoxide air emissions (one SCR/CO catalyst per exhaust train). Additionally, there are no known sensitive habitats in or surrounding the project area; therefore, the addition of small amounts of nitrogen to the area would result in a less-than-significant impact on soil-vegetation systems.

5.11.3 Cumulative Effects

A cumulative impact refers to a proposed project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code §21083; CCR, title 14, §15064(h), 15065(c), 15130, and 15355).

The project's effects on soil erosion, sedimentation, and compaction would not be significant with the implementation of mitigation measures described in Section 5.11.4.1. According to

City of Oakley engineering staff, no projects are currently in the planning phase in this area (Bourgeois, 2009). Therefore, the potential for cumulative impacts of the proposed CCGS combined with other projects would be low.

5.11.4 Mitigation Measures

BMPs in accordance with the SWPPP and DESCP will be used to minimize erosion at the site during construction. These erosion-control measures would be required to help maintain water quality, protect property from erosion damage, and prevent accelerated soil erosion or dust generation that destroys soil productivity and soil capacity. Typically, these measures include mulching, physical stabilization, dust suppression, berms, ditches, and sediment barriers. Water erosion will be mitigated through the use of sediment barriers, and wind erosion potential will be reduced significantly by keeping soil moist or by covering and/or hydroseeding soil stockpiles. Upon completion of construction activities, land surfaces will be permanently stabilized. The site will be paved or completely covered with structures or pervious ground cover (for example, gravel or landscape). Therefore, soil erosion losses after construction are expected to be negligible.

5.11.4.1 Temporary Erosion Control Measures

BMPs will be implemented during construction in accordance with the SWPPP required by the State's General Construction Permit for all construction projects over 1 acre in size. Additionally, the CEC requires that project owners develop and implement a DESCP to reduce the impact of runoff from the construction site.

Temporary erosion control measures required for the SWPPP and DESCP would be implemented before construction begins, and would be evaluated and maintained during construction. These measures typically include but are not limited to revegetation, mulching, physical stabilization, dust suppression, berms, ditches, and sediment barriers. These measures would be removed from the site after the completion of construction.

During construction of the project, dust erosion control measures would be implemented to minimize the wind-blown loss of soil from the site. Water of a quality equal to or better than existing surface runoff would be sprayed on the soil in construction areas to control dust prior to completion of permanent control measures.

Sediment barriers, which slow runoff and trap sediment, would be incorporated as discussed below. Sediment barriers include straw bales, sand bags, straw wattles, and silt fences. They are generally placed below disturbed areas, at the base of exposed slopes, and along streets and property lines below the disturbed area. Sediment barriers are often placed around sensitive areas to prevent contamination by sediment-laden water near areas such as wetlands, creeks, or storm drains. Such barriers will be placed upgradient from the mitigation wetland to prevent sediment from discharging into it.

A bioswale will be constructed south of the line of trees on the northern boundary of the project site. This feature will filter particulates and remove nutrients and other pollutants, while directing runoff toward the wetland area.

The site will be constructed on relatively level ground; therefore, it is not considered necessary to place sediment barriers around the entire property boundary. However, some

barriers would be placed in locations where offsite drainage could occur to prevent sediment from leaving the site. If used, sediment barriers would be properly installed (e.g., staked and keyed), then removed or used as mulch after construction. Runoff detention basins, drainage diversions, and other large-scale sediment traps are not considered necessary because of the site's small size, level topography, and surrounding paved areas. Sediment barriers would be installed around the base of the soil stockpiles, and stockpiles would be stabilized and covered.

Mitigation measures, such as watering exposed surfaces, are used to reduce PM_{10} emissions during construction activities. The PM_{10} reduction efficiencies are taken from the South Coast Air Quality Management District (SCAQMD) CEQA Handbook (1993) and were used to estimate the effectiveness of the mitigation measures. Table 5.11-4 summarizes the mitigation measures and PM_{10} reduction efficiencies.

TABLE 5.11-4
Mitigation Measures for Fugitive Dust Emissions

Mitigation Measure	PM_{10} Emission Reduction Efficiency (%)
Water active sites at least twice daily	34–68
Enclose, cover, water twice daily, or apply non-toxic soil binders, according to manufacturer's specifications, to exposed piles (gravel, sand, dirt) with 5 percent or greater silt content	30–74

Source: SCAQMD CEQA Handbook, Table 11-4 (1993)

5.11.4.2 Permanent Erosion-control Measures

Permanent erosion-control measures on the site will include gravel, paving, and drainage systems.

5.11.4.3 Geotechnical Soil Investigation

The project owner has completed a preliminary geotechnical investigation geotechnical soil investigation to evaluate the engineering characteristics of project site soils and determine remedial measures to address impacts related soil properties. Recommendations provided in the geotechnical report will be followed to mitigate potential impacts related to soil texture and expansiveness. The preliminary geotechnical report is provided as an attachment to Appendix 2G. A final geotechnical investigation will be conducted to support final design.

5.11.4.4 DuPont Soil Stockpiles

DuPont has requested the use of any excess soils resulting from initial leveling and grading of the CCGS site. Figure 1.1-2 shows the locations of the three soils stockpile areas where DuPont proposes to store the stockpiled soil. DuPont plans to use this material during build-out of the DuPont Oakley Specific Plan. The Applicant will move the soils and create and stabilize these soil piles in accordance with all applicable BMPs. After this takes place, stockpiled, the soil stockpiles will be owned and maintained by DuPont in accordance with all applicable BMPs.

5.11.5 Laws, Ordinances, Regulations, and Standards

Federal, state, county, and local LORS applicable to soils are discussed below and summarized in Table 5.11-5.

5.11.5.1 Federal LORS

5.11.5.1.1 Federal Clean Water Act

The 1972 Amendments to the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA), establish requirements for discharges of stormwater or wastewater from any point source that would affect the beneficial uses of waters of the United States. The CWA effectively prohibits discharges of stormwater from construction sites unless the discharge is in compliance with an NPDES permit. The State Water Resources Control Board (SWRCB) is the permitting authority in California and has adopted a statewide general permit for stormwater discharges associated with construction activity (General Construction Permit; SWRCB, 1999) that applies to projects resulting in 1 or more acres of soil disturbance. The proposed project would result in disturbance of more than 1 acre of soil. Therefore, the project would need to be covered under the General Construction Permit and develop and implement a site-specific SWPPP to meet permit requirements. Requirements are described in greater detail in Section 5.15, Water Resources.

The CWA's primary requirement for soils in the project area consists of control of soil erosion and sedimentation during construction, including the preparation and execution of erosion- and sedimentation-control plans and measures for any soil disturbance during construction.

TABLE 5.11-5
Laws, Ordinances, Regulations, and Standards for Soils

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
1972 Amendments to Federal Water Pollution Control (Clean Water Act, including 1987 amendments)	Regulates stormwater discharge from construction and industrial activities	SWRCB and Central Valley Regional Water Quality Control Board (RWQCB). U.S. Environmental Protection Agency has oversight authority.	Section 5.11.5.1.1
Natural Resources Conservation Service (1983), *National Engineering Handbook*, Sections 2 and 3	Standards for soil conservation	Natural Resources Conservation Service	Section 5.11.5.1.2
State			
Porter-Cologne Water Quality Control Act	Regulates stormwater discharge	SWRCB and Central Valley RWQCB	Section 5.11.5.2.1
Table 18-1-B of the Uniform Building Code (International Code Council, 1997)	Sets standards for defining expansive soils	CEC	Section 5.11.2.5

TABLE 5.11-5
Laws, Ordinances, Regulations, and Standards for Soils

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
California Streets and Highways Code	Sets permit requirements for activities conducted within the right-of-way of state highways	Caltrans	Section 5.11.5.2.2
Local			
Contra Costa County Clean Water Program	Requirements for stormwater compliance for construction activities	City of Oakley Public Works and Engineering Department	Section 5.11.5.3.1
City of Oakley Municipal Code	Permit requirements for construction activities conducted within the city's jurisdiction	City of Oakley Public Works and Engineering Department	Section 5.11.5.3.2

5.11.5.1.2 U.S. Department of Agriculture Engineering Standards

Sections 2 and 3 of the U.S. Department of Agriculture, NRCS National Engineering Handbook (NRCS, 1983) provide standards for soil conservation during planning, design, and construction activities. The proposed CCGS project will conform to these standards during grading and construction to limit soil erosion.

5.11.5.2 State LORS

5.11.5.2.1 California Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code, Division 7) is the state law governing water quality in California, and designates responsibilities to the SWRCB and nine RWQCBs to coordinate and control water quality. As described above, in 1999, the SWRCB adopted a general NPDES permit, in compliance with the CWA, to regulate stormwater discharges from construction sites greater than 1 acre in size. The proposed CCGS site lies within the jurisdiction of the Central Valley RWQCB; this RWQCB would ensure that the project complies with the General Construction Permit requirements.

5.11.5.2.2 California Streets and Highways Code

The California Streets and Highways Code, Sections 660 to 734, gives the California Department of Transportation (Caltrans) the authority to permit improvements and other activities on the state's highway system rights-of-way. An encroachment permit would be required if construction or utility installation activities take place within the Caltrans right-of-way on State Route 160. Detailed instructions for obtaining an encroachment permit are in the Encroachment Permit Application Guide (Caltrans, 2009).

5.11.5.3 Local LORS

5.11.5.3.1 Contra Costa County

The Contra Costa Clean Water Program was developed in compliance with the municipal NPDES permit issued by the State to Contra Costa County, and participating municipalities

include most of the cities, including Oakley, within the county. The Clean Water Program requires that, for development projects resulting in 1 acre or more of impervious surfaces, treatment and source control measures must be developed and implemented, plus runoff flow must be controlled so that post-project runoff does not exceed estimated pre-project rates or durations. Requirements applicable to the proposed project, including construction of the proposed bioswale, are described in the Stormwater C.3 Guidebook (Contra Costa County, 2008).

5.11.5.3.2 City of Oakley Municipal Code

Prior to construction of the proposed site, including any clearing and grubbing or locating grading equipment on the property, a grading permit will be required in accordance with City of Oakley Municipal Code (6.9.202). The grading code includes requirements for grading within the City, exceptions and exclusions from the code, and details the information required for grading permit application (6.9.306). A grading permit cannot be issued until an erosion control plan has been accepted for review by the City (6.9.308). Requirements for the erosion control plan can be found in the Municipal Code (6.9.404). The City of Oakley Municipal Code also requires that an onsite paving permit be obtained for any paving work on new parking lots, new private streets, or overlays of existing parking lots or private streets (6.9.310). An erosion control permit is required for any project requiring a grading or paving permit; but the erosion control permit and paving permit are usually included within the scope of the grading permit (3.9.308). The grading permit would also include a stockpile plan, which identifies locations and BMPs proposed for stabilizing stockpiled soil materials. If any fill is to be delivered onsite for use in construction, then a soils report, which certifies that the material is of adequate quality for the proposed use, and a proposed haul route must be submitted to the City as part of the grading permit process. Any construction activities that occur within the right-of-way of a public road or street, or within an easement under the jurisdiction of the city, must first obtain an encroachment permit (6.9.302).

The Municipal Code contains provisions for design of slope drainage, including earthen swales (6.9.502). The bioswales feature planned for the project site to carry stormwater runoff toward the mitigation wetland would need to conform to these requirements.

BMPs and standards are found in Section 6.11.212 of the Municipal Code. All projects that could potentially contribute pollutants to the City's stormwater system must following the BMPs specified in this section. Construction activities are required to conform to the requirements of the California Stormwater Quality Association Stormwater Best Management Practices Handbook for Construction Activities, the Association of Bay Area Governments Manual of Standards for Erosion and Sediment Control Measures, the City's grading and erosion control ordinance and other generally accepted engineering practices for erosion control.

5.11.6 Agencies and Agency Contacts

Applicable permits and agency contacts for soils are shown in Table 5.11-6.

TABLE 5.11-6
Permits and Agency Contacts for Soils

Permit or Approval	Agency Contact	Applicability
City of Oakley: Grading, Erosion Control, Paving, Encroachment Permit	Allen Bourgeois, Assistant Engineer City of Oakley Public Works and Engineering Department (925) 625-7039	Construction activities
City of Oakley: Stormwater Compliance	Keith Coggins City of Oakley Public Works and Engineering Department (925) 625-7155	Construction compliance with the Contra Costa Clean Water Program (C.3)
SWRCB General Construction Permit	Greg Gearheart, Sr. Water Resource Engineer State Water Resources Control Board Caltrans District 4 (510) 622-0724	Construction activities with a disturbed area of 1 acre or more
Caltrans Encroachment Permit		Utilities installation within Caltrans right-of-way in SR160

5.11.7 Permits and Permit Schedule

It is expected that all the required permits for grading can be secured as long as completed applications are provided to the appropriate agency a minimum of 6 months prior to construction.

5.11.8 References

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